

REMARKS

This Amendment is responsive to the Office Action mailed on November 18, 2008, rejecting all pending claims 47-65. By this response claims 47-48, 50, 54, 56-57, and 64 are amended. Claims 49, 51-53, 55, 58-63 and 65 are canceled. New claims 66-69 are added to the application. Consideration and allowance of claims 47-48, 50, 54, 56-57, 64 and 66-69 is requested.

Claims 47-65 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. In particular, the Office Action objected to the use of a number of terms including "about," "substantially," "flexible" and "hard" that were asserted to be unclear. The applicant respectfully disagrees with this assertion. Terms of these types are commonly used in patent claims, and the meaning in these particular claims is clear given the detail in the specification of the application. However, to expedite prosecution of this application, in the pending claims the noted terms have been either deleted or a more definite basis for their meaning added. Withdrawal of the §112 rejections in view of these amendments is requested.

Claims 47-65 were rejected under 35 U.S.C. §102 and / or §103 as being anticipated by or obvious over the Carson U.S. Patent 6,383,614. By this response, however, independent claim 47 has been amended to more particularly point out and distinctly claim the applicant's invention, and to better distinguish this invention from the prior art of record including the Carson patent. All pending claims 47-48, 50, 54, 56-57, 64 are now directed to an article of clothing to be worn over a curved body portion, including shirts, pants, jackets, wet suits, knee pads, gloves and aprons. The article includes a curved exterior portion formed from flexible and abrasion resistant composite fabric comprising a woven substrate and an array of thermoset resin guard plates on the substrate. The recited substrate has an abrasion resistance and sufficient flexibility to be conformable to the curved exterior portion of the article of clothing from a planar configuration. The recited guard plates: (1) are non-overlapping, hard, convex geometric-shaped printed guard plates, (2) arranged in a pattern separated by gaps and having an area with major and minor dimensions, (3) the resin

material of the guard plates partially penetrates in the woven substrate across the entire area of the guard plates to provide a mechanical bond between the guard plates and the substrate to prevent detaching of the guard plates from the substrate when the composite fabric is conformed to the curved state and flexed, (4) have an area parallel to the substrate with a major dimension to minor dimension aspect ratio between 2 and 1, (5) the width of the gaps is between 30 and 50 mils, (6) the thickness of the guard plates is between 5 and 20 mils and is less than the lengths of the minor dimensions, (7) the minor dimensions are between 60 and 100 mils, (8) the guard plates are harder than the substrate such that overall flexibility of the composite fabric is determined by the flexibility of the substrate and the distances between the guard plates, and (9) the overall abrasion resistance of the composite fabric is at least 10 times greater than the abrasion resistance of the substrate. No new matter is added by these amendments since all these features are disclosed in the specification and drawings.

Articles of clothing formed from fabric having these well defined features offer important advantages. The strength and abrasion resistance can provide a high degree of protection to persons wearing the clothing. Importantly, this protection can be achieved by fabric that still has sufficient flexibility and suppleness to be formed into the clothing items. Neither the Carson patent nor the other prior art of record teaches or suggests clothing items having these well defined features and associated advantages.

The Carson patent is directed to an absorbent and cut resistant sheet material for placement on generally planar supporting surfaces such as a countertop or table. Moreover, the specific features of the applicant's invention are not disclosed. The sheet material disclosed in the Carson patent will therefore not offer the advantages of the articles of clothing recited by the amended claims. This conclusion is supported by the fact that there is no suggestion in the Carson patent that the sheet material disclosed therein is even suitable for protective clothing applications.

Durability is an important characteristic of clothing applications. The claimed articles of clothing are formed from abrasion resistant material and have a woven substrate. Woven substrates have relatively high tensile strengths that contribute to these desirable durability characteristics. The material disclosed in the Carson patent, on the other hand, has a fluid

impervious backing and a fluid absorbent layer, neither of which are disclosed as being formed from a woven material. Instead, non-woven materials such as paper towels are described for the fluid absorbent layer. These non-woven materials are typically formed from relatively short and entangled filaments. Materials of these types have relatively low tensile strengths. They are therefore weak and will burst or tear easily, especially when hard plates that provide stress concentration points are affixed to the material. Woven substrates, in contrast, have relatively long continuous threads that can support the high tensile stresses encountered in protective clothing applications where the claimed invention is used.

Nor does the Carson patent disclose guard plates having the size and spacing of those recited by the claims. The typical size of the reinforcing elements shown in the Carson patent is 10 mm. This is a factor of 4 times greater than 100 mil (about 2.5 mm) maximum minor dimension size of the guard plates in the recited fabric. Bond strength can be measured in terms of peel strength, which is the force per unit width needed to peel the plate off the substrate, and in terms of shear strength, the force required to shear the plate off the substrate. Peel strength varies approximately linearly with the width of the plate, and shear strength varies approximately quadratically with plate width. If reinforcing elements of the size in the claimed invention were used on the substrates disclosed in the Carson patent, the bond strength would be greatly reduced, likely resulting in a bond that was too fragile to remain attached during use.

The fabric recited in the claimed invention, on the other hand, makes effective use of the relatively small guard plates. Specifically, guard plates with minor dimensions between 60 and 100 mils, spaced by gaps between 30 and 50 mils, provide the fabric with the sufficient degree of flexibility and suppleness to enable it to be fabricated into articles of clothing that must fit curved body portions. Although the Carson patent describes the sheet material disclosed therein as having some flexibility, it is clear from the listed material characteristics that it would not be sufficiently flexible to be useful in protective clothing applications. This is consistent with the fact that there is no suggestion in the Carson patent that the sheet material can be used for clothing applications.

Even though the recited guard plates are relatively small, the three dimensional structure caused by the partial penetration of the resin material into the woven substrate causes the bond to have sufficient strength to prevent the guard plates from peeling and shearing during use in protective clothing applications. Furthermore, the 5 – 20 mil thickness of the guard plates provides vertical height that prevents abrading objects from coming into contact with the substrates in the gaps.

For these reasons, the Carson patent neither teaches nor suggests protective clothing items formed from abrasion resistant material having the specific recited features. Withdrawal of the §102 and §103 rejections of claims 47-48, 50, 54, 56-57, 64 based on the Carson patent is therefore requested.

Claims 47-65 are also rejected under 35 U.S.C. §103 as being unpatentable over the Carson patent in view of the Mitchell U.S. Patent 4,548,852. Briefly, the Office Action asserts that it would have been obvious to make the guard plates from the materials and shapes disclosed in the Mitchell patent.

The Mitchell patent discloses a food tray having mounds (14, 22) for supporting the food above the bottom of the tray, an application very different than the guard plates of the recited invention. There is therefore no reason why a person of skill in the art would substitute the features of the mounds shown in the Mitchell patent into the cut resistant sheet material shown in the Carson patent. Furthermore, there is no suggestion in the Mitchell patent that these mounds could have the material and size characteristics of those recited in amended claim 47. Even assuming for purposes of argument, but not conceding that it would have been obvious to make the substitution described in the Office Action, the resulting product would therefore still not have the features and advantages of that recited by claims 47-48, 50, 54, 56-57, 64. Withdrawal of the §103 rejection of claims 47-48, 50, 54, 56-57, 64 based on the Carson and Mitchell patents is therefore requested.

New claims 66-69 are added to the application by this Amendment. These claims depend directly or indirectly from claim 47 and recite articles of clothing having additional features and associated advantages. Consideration and allowance of claims 66-69 are requested.

In conclusion, claims 47-48, 50, 54, 56-57, 64 and 66-69 are now in condition for allowance. Notice to that effect is respectfully requested.

Respectfully submitted,

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